Remarks

Claims 1-23 are pending in the application. Claims 1-23 stand rejected.

Claims 1, 12-19, 22, and 23 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kinast (US 5,995,858).

Claims 1, 4, 6, 7, 19, and 20 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Fuller *et al.* (US 5,792,668).

Claims 2, 3, and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuller *et al.*

Claim 8 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuller *et al.* in view of Napholz *et al.* (US 5,113,869).

Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuller *et al.* in view of New Jr. *et al.* (US 6,494,829).

Claims 10 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuller *et al.* in view of Papadakis *et al.* (US 5,461,921).

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuller *et al.* in view of Papadakis *et al.* (US 5,461,921) and in further view of Feldman *et al.* (US 5,265,613).

Claims 1, 17, 18, and 19 have been amended. Claims 14, 15, 16, and 23 have been cancelled. Claims 2-13 and 20-22 remain in the application unamended.

THE PRESENT APPLICATION

The present application is directed to a spread spectrum measurement device. More particularly, the disclosure relates to a device that uses spread spectrum transmission and detection techniques to measure medical conditions such as contact impedance, patient heart rate, and patient respiration rate.

As indicated FIG. 1, in one embodiment, the spread spectrum measurement device 100 comprises a medium interface 102 that communicates with the medium that is being monitored. By way of example, this interface 102 can comprise a patient interface including one or more electrodes used with a defibrillator or ECG machine. The device 100 further comprises a signal transmitter 104 that directs an input signal into the medium, and a signal detector 106 that detects a parameter that corresponds to the input

signal. By way of example, the signal transmitter 104 is a current signal transmitter and the signal detector 106 is a voltage detector. Alternatively, the signal transmitter 104 can be a voltage signal transmitter and the signal detector 106 can be a current detector. In another arrangement, the transmitter can be an electromagnetic radiation source such as light source and the detector can be an electromagnetic radiation detector such as a light detector. In yet another example, the transmitter is an acoustic source and the detector is a corresponding transducer.

Irrespective of the type of input signal, the input signal comprises a spread spectrum signal. In one arrangement, this spread spectrum signal is created with the aid of a random signal generator 108 that is in electrical communication with the signal transmitter 104 as well as the signal detector 106. By way of example, the generator 108 can comprise a clock signal generator 110, a divider 112, and a random number generator 114. The clock signal generator 110 produces a clock signal in the form of a square waveform that toggles from an "on" position to an "off" position at a particular frequency. As its name suggests, the random number generator 114 randomly generates numbers within a particular range. The numbers generated by the number generator 114 are provided to the divider 112, which also receives the clock signal from the clock signal generator 110. The divider 112 divides the clock signal by the numbers provided by the random generator to output a randomized clock signal to the signal transmitter 104. This spread spectrum method is commonly referred to as frequency hopping. *See, present application*, p. 4, l. 12 - p. 5, l. 14. *See, also, present application*, p. 9, l 12 - p. 10, l. 3.

THE KINAST REFERENCE

Kinast relates to oximeters which measure levels of blood oxygenation and, in particular, to a plethysmograph system for pulse oximetry having a reduced noise sensitivity. *See, Kinast*, c:1, l:5-7.

More specifically, Kinast teaches that a method for reducing the systems susceptibility to noise is to choose a reference waveform, such as a sinusoid, which has a poor correlation with the noise. Such a method would work even if the amplifier bandwidth remains very wide. However, effective use of a sinusoid requires the employment of a demodulator which performs true multiplication, rather than the much

simpler switching circuits which can be employed when the reference signal takes the form of a train of rectangular pulses. The basic requirements for this reference waveform are:

1) It must correlate with the LED drive signal in its own channel, i.e. the red demodulator must correlate 100% with the red LED.

2) It must have zero correlation with the LED drive signal from the other channel, i.e. the red demodulator must correlate 0% with the IR LED.

3) It must have minimal correlation with noise, but should be a simple train of rectangular pulses, to facilitate demodulator design.

Requirement one can be met by using the same signal for the LED drive and the reference signal. Requirement two simply means that the signals used for the two channels must be orthogonal. For some waveshapes, this may mean a 90 degrees phase shift. Requirement three can be met by using a class of signals, known as pseudo random sequences, for the reference signal. These signals look like noise but are cyclical. The have the property of correlating with themselves but poorly correlating with other signals, such as noise or an interference frequency. It is possible to make orthogonal sets of these waveforms. Pseudo random signals are used in fields such as spread-spectrum and communications and satellite navigation systems like global positioning satellite (GPS).

Referring to FIG. 1, implementation of pseudo random sequences involves programing the timing generator 10 such that the red driver 12 and the IR driver 14 are driven by pseudo random signals. A first pseudo random signal (replacing the third signal 12) is used to drive the red LED 20 and is used in demodulation as the reference signal for the red demodulator 28. A second pseudo random signal is used to drive the red LED 20 (replacing the fourth signal 18) and is used in demodulation as the reference signal for the red demodulator 28. *See, Kinast*, c:13, l:32 - c:14, l:7.

THE CLAIMS DISTINGUISH PATENTABLY AND NON-OBVIOUSLY OVER THE PRIOR ART OF RECORD

Claim 1, as amended is directed to a method for measuring a desired condition, comprising: directing a spread spectrum signal into a medium; detecting a parameter that corresponds to the signal directed into the medium; generating a measured parameter

signal from the detected parameter; analyzing the measured parameter signal to determine the desired condition; and generating a clock signal that is used to spread the signal directed into the medium across a desired frequency by randomizing the clock signal with a random number generator and a divider.

Claim 1 has been amended to include the limitations of claim 16 (as well as its intervening claims) which, it is respectfully submitted, is patentable over the prior art of record. More specifically, it is respectfully submitted that Kinast does not teach or suggest the step of generating a clock signal that is used to spread the signal directed into the medium across a desired frequency by randomizing the clock signal with a random number generator and a divider as set forth in claim 1.

As noted above, the present application discloses that the clock signal generator 110 produces a clock signal in the form of a square waveform that toggles from an "on" position to an "off" position at a particular frequency. As its name suggests, the random number generator 114 randomly generates numbers within a particular range. The numbers generated by the number generator 114 are provided to the divider 112, which also receives the clock signal from the clock signal generator 110. The divider 112 divides the clock signal by the numbers provided by the random generator to output a randomized clock signal to the signal transmitter 104. As one skilled in the art will appreciate such a divider serves to control the frequency of the clock signal such that a randomized clock signal is produced over a desired spectrum.

By contrast, when addressing claim 16, the Office Action states that Kinast teaches such a divider in that Kinast teaches a divider in the timing generator 10 which divides a random clock signal into first and second pseudo random signals.

Accordingly, the Office Action states that Kinast teaches a divider which divides a signal into two signals, whereas claim 1 is directed to randomizing the clock signal with a random number generator and a divider.

In light of the foregoing, reconsideration and withdrawal of the rejection of claim 1 under Kinast is respectfully requested.

It is submitted that claim 16 was only rejected under Kinast. Accordingly, the rejections of claim 1 and its dependent claims on grounds other than Kinast are rendered moot by the present amendment of claim 1.

Claims 2-13 depend from claim 1. For at least the reasons set forth above in connection with the patentability of claim 1, reconsideration and withdrawal of the rejections of claims 2-13 is respectfully requested.

Claims 17-19 have been amended to include, analogously, the limitations of claim 16. Accordingly, the reasons set forth above in connection with the patentability of claim 1 can be applied, *mutatis mutandis*, to claims 17-19. Reconsideration and withdrawal of the rejections of claim 17-19 is therefore requested.

Claims 20-22 depend from claim 19. For at least the reasons set forth above in connection with the patentability of claim 19, reconsideration and withdrawal of the rejections of claims 20-22 is respectfully requested.

Conclusion

Applicant submits that claims 1-13 and 17-22 distinguish patentably and non-obviously over the prior art of record and are in condition for allowance. An early indication of allowability is earnestly solicited.

If any extension of time is required relative to this Amendment A, Applicant hereby petitions for such extension. Authorization to charge deposit account 14-1270 for the fees associated therewith or otherwise necessary in connection with the related application is hereby provided.

Respectfully submitted,

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